

The Council on Ionizing Radiation Measurements and Standards (CIRMS) represents users of ionizing radiation and radioactive sources engaged in medical radiation and other programs. CIRMS provides a forum for discussing ionizing radiation issues; identifying, defining and prioritizing needed work for standards; disseminating information on standards; and organizing workshops and meetings to advance ionizing radiation technology. The National Institute of Standards and Technology (NIST) is heavily involved with this organization and considers its directives as statements of work to be completed. A presentation of the research and measurements made for standards for Medical Diagnostic Radiology Applications will be summarized addressing two major topics: Molybdenum (Mo) and Rhodium (Rh) anode beams for mammographic chamber calibrations and the establishment of medium filtration x-ray beams for other diagnostic radiographic applications. Each of these standards is described in Measurement Program Descriptions (MPD), which are statements of requirements and the reasons for the measurements. The measurements performed for establishing mammographic calibration x-ray beams will be reviewed. Calibration standards with molybdenum and rhodium anode x-ray beams, with molybdenum and rhodium filters, respectively, were established using a variable length Attix Free air chamber. Results from a comparison of this free air chamber with the Ritz free air chamber will be given. The application of the Attix free air chamber to establish these beams at molybdenum and rhodium will be reviewed. The transfer of these beams to the ADCLs and CDRH will also be discussed. The particular application of the mammography beams at the FDA/CDRH will be reviewed, providing brief background information about the FDA's need for traceability of measurements. The role of the CDRH Calibration Laboratory and the FDA's concerns over the lack of Molybdenum and Rhodium-target national standards in the advent of MQSA regulations will be discussed. The difficulties and successes of the CDRH Calibration lab's experience in matching the NIST beams and accreditation requirements will be reviewed. A clarification of the proficiency test requirement in the MQSA final rule will be presented. Following the establishment of Mo and Rh beams, a comparison was made of the response of mammography ionization chambers to the tungsten anode, aluminum filter beam at 0.36 mm Al half value layer. There is also a need for two particular beams for general diagnostic chamber calibrations to be established at NIST. The method of establishing beams appropriate for diagnostic ionization chamber calibrations at 3.0 mm Al half value layer and 10.0 mm Al half value layer will be reviewed. The M80 beam (HVL of 3.0 mm Al) is appropriate for general diagnostic use. The M120 beam (HVL of 10.0 mm Al) is appropriate for CT chamber use. These two beams fill in a gap in the spectra needed for diagnostic chambers. The method used by NIST for the establishment of these beams and their agreement with other beams in the series will be discussed. Educational objective: An understanding of equipment and methodology involved in the establishment of standards for Diagnostic Radiological Applications.